



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

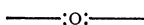
We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Summing up the facts of geographical distribution, as the species are now understood, we have two entirely distinct groups of these mollusks which, in general terms, may be said to be governed in distribution by geographical features, and two of them—one of the two being doubtful—appearing common to the two areas; *Campeloma decisum* has the northernmost range, and *Campeloma ponderosum* the southernmost. Further collections are yet needed to fix definitely the range of the several species, and to properly define their specific relationship.

It might be added, in concluding this note, that these neglected mollusks promise a rich reward for him who shall study them anatomically. Their life-history is entirely unknown; the limits of the species poorly understood and thus far often misinterpreted; and what is important from a purely zoölogical standpoint, their geographical distribution and the influence of environment need careful elaboration.



MOSSES.

BY PROFESSOR W. W. BAILEY.

MOSSES have always had a peculiar attraction for certain students, yet there are comparatively few who study them. In ordinary school or even college courses of botany they are barely mentioned. Indeed, the study of Cryptogams, or flowerless plants, is by far too much neglected. Ferns, it is true, have many votaries, scientific and amateur, but one rarely hears of any but a specialist engaged in the examination of mosses, lichens, or fungi. Algæ have been more fortunate, and have always excited more or less popular interest.

It is, undoubtedly, the difficulty attending the study of mosses that has caused them to be so much neglected. One must be rather expert with the microscope to accomplish much in their investigation. This entails expense, but after all not so much but that many persons of fair means might indulge in the pursuit. A good microscope, with its appurtenances, is to-day within the reach of any who care to husband their resources for a while with the object of securing one. I must say, however, in passing, that any purchaser who is himself unfamiliar with the instrument,

should always consult some specialist, otherwise he is likely to commit an egregious error in his investment.

Mosses can be studied throughout the year, hence they afford a most delightful winter occupation. Certain species, varying with the season, can always be found in condition, but of course some regions are much more favored than others. In the White mountains, for instance, mosses literally cushion the rocks, clothe the standing or fallen trees, and spread over the ground. Often they hang from moist cliffs in those billowy curves assumed by snow heaps on a roof. The traveler sinks knee deep in the drifts they form. The number of species is often bewildering. A mat removed, say from some wind-fall, is discovered to be a tangle of many kinds. It would require an expert to separate them. Often they are found, as in the case of the genus *Fontinalis*, trailing in springs or running streams. They climb, too, high up into the Alpine regions, some kinds being found only on giddy mountain tops.

A few words about the study of these bewitching little plants. One first has to determine whether the fruit is *terminal* or *lateral*, that is, whether borne at the ends of the stems or as an outgrowth from the sides. Mosses are by this means divided into two great sections, the *Acrocarpi* and the *Pleurocarpi*. Any *Polytrichum* would be an example of the first class, and a *Hypnum* of the second. It is not always an easy matter to determine this point. Having settled it, however, one next examines the *urn*, *capsule* or *theca* (it is known by either of these names), to discover whether or not it is covered by an *operculum*. This is a sort of lid, which may be deciduous or persistent. If it does not fall away the plant is looked for in Section A of the artificial key of Gray's Manual (edition of 1863, now out of print and rare). Otherwise we proceed to Section B. Under this second head we find that the mouth of the capsule may or may not be provided with *teeth*. These if present are always in *fours* or multiples of *four*. Within these teeth there are frequently subordinate processes called *cilia*, and within these again *ciliolæ*. All these must be carefully looked for. It should be said, also, that it is very important to count the external teeth, which may range as high as sixty-four; they form the peristome. Delicate manipulation may be required to estimate them, both in the use of the lenses and illumination, and in the handling of the knives and needles. External to the teeth

lies the ring or *annulus* upon which they are inserted. It varies much in its development. The capsules, it should be mentioned, are, at some period of their growth, clothed with a membranous cover, either entire like a candle extinguisher, when it is *mitriform*, or split on one side and hood-like, when it is *cuculliform*. This body, called the *calyptra*, is apt to be fleeting, and hence easily lost. It is often entirely absent in mature specimens, but is important and should always be secured if possible. The capsules assume all kinds of forms—cylindric, oblong, globose, pyriform, unequal sided, obovoid, etc. The powdery particles they contain are the *spores* or *sporules*. The capsules are borne on thread-like *pedicels*, though sometimes nearly or quite sessile. An enlargement of the pedicel just below the urn is known as *apophysis*. The elongated receptacle of the flower takes the name of the *vaginula*. Often the capsules are immersed or partly hidden in the floral (*perichætical*) leaves, as in *Fontinalis*. "Intermixed with the reproductive organs are cellular, jointed filaments (*paraphyses*).” Mosses have two kinds of reproductive organs, sometimes separated on different plants (*diœcious*), but oftener found on distinct portions of the same plant (*monœcious*). Some are even *polygamous*. The fruit of quite a number is not known at all. The process of reproduction is quite recondite, and beyond the scope of the present article.

It should be said that the character of the stem and of the leaves is most important. The latter must be closely studied as to their shape, margins and appendages. The mid-rib may be prominent, forming a *costa*, or even prolonged above into an *awn*. The so-called *areolation* or arrangement of the cells of the leaves is quite characteristic, assuming very beautiful geometric forms. In *Sphagna*, which some authors separate from true mosses, delicate cross sections of the leaves must be examined.

There are many points of terminology and description upon which I have not here entered, indeed, the terms used are extremely numerous, and to a beginner perplexing. One learns to master them and their application only by persistent use. They are usually defined in any good manual of mosses or any general botanical glossary.

At every step of one's work in the study of mosses he is impressed with the extraordinary beauty of the objects revealed. The leaves are wonderful microscopic objects, and the capsules

with their teeth, often hygrometric, are fashioned with the utmost delicacy. Then the whole habit of the various plants is so diverse! Some are prostrate; others growing erect, like Poly-

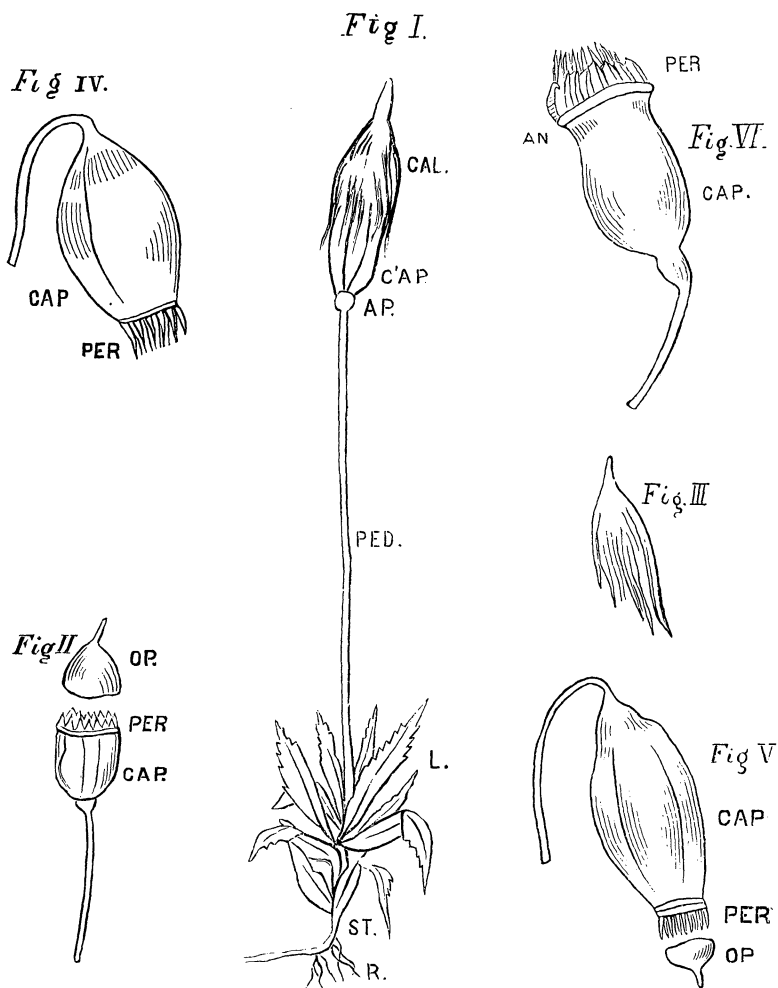


FIG. I.—A Polytrichum. *cal.*, calyptra; *cap.*, capsule; *ap.*, apophysis; *ped.*, pedicel; *L.*, leaves; *st.*, stem; *r.*, roots. FIG. II.—The same with calyptra removed. *op.*, operculum; *per.*, peristome; *cap.*, capsule. FIG. III.—Hairy calyptra of same. FIG. IV.—A Mnium. *cap.*, capsule; *per.*, peristome. FIG. V.—The same. *cap.*, capsule; *per.*, peristome; *op.*, operculum. FIG. VI.—A Hypnum. *per.*, peristome; *an.*, annulus; *cap.*, capsule.

trichum, imitate pine forests; others, like Climacium, resemble miniature palms. In Barbula the teeth are curiously twisted.

The foliage of some is dark-green in color; of others reddish or brownish, and in *Leucobryom* it is almost white.

Mosses are widely distributed over the earth from the equator to the poles, and inhabit very diverse locations. When dried up by the heats of summer they will soon recover under the influence of moisture, at once resuming their vivid colors and beauty. They are probably among the oldest of the existing families of plants, and their part in life is to prepare the way, by their action on the soil and decomposition, for the higher vegetation. This task they share with lichens, whose history is perhaps even lower. Their direct economic uses are few, but as objects of study they will ever possess an increasing interest.

The collection of mosses is a comparatively simple matter, and may be here briefly stated for the guidance of such as may be inclined to gather them. In the first place, having selected some specimen for preservation, shake out from it as much as possible of the soil, or if the plant is attached to a tree, obtain a thin slice of the bark to which it adheres. Always make notes of the medium from which it is obtained, as earth, tree or rock. If the kind of tree is known, indicate it on the accompanying label. It should be stated, too, if the tree on which it grows is dead or alive, or if the moss is on the ground, the character of the soil. Remember to affix the time and place of collection. The specimens are best preserved in a portfolio of binder's boards, or a book 10 × 15 inches, which can be tied together by tape or strings, and is filled with bibulous paper. The collector should carry with him into the field besides, a number of paper envelopes or pockets for the reception of specimens. Put but one species in each pocket. They require comparatively little pressure. For mounting use a firm white paper six inches in length by four and a quarter ($6 \times 4\frac{1}{4}$) in width. The plants can be attached by means of paste, and arranged in books or loose sheets in the herbarium.

Lastly, it may be of interest to state the names of some of the American botanists who have been especially distinguished in this field. Of these the late Wm. S. Sullivant is perhaps the best known. He prepared the paper on mosses for Gray's Manual, besides many elaborate and costly illustrated works. Death has lately removed those other accurate and careful muscologists, Coe F. Austin, of New Jersey, and Thos. P. James, of Cambridge,

Mass. The veteran Professor Tuckerman, of Amherst, still remains, and from him and Professor Lesquereux, of Columbus, Ohio, the well-known palæontologist, we now hope to obtain a work on mosses to supply the place of the old manual and to bring the science up to date.

—:o:—

EMOTIONAL EXPRESSION.

BY A. T. BRUCE.

TO Darwin, more than to any previous investigator, must be credited precise and comprehensive explanations of emotional expression, owing largely to the prominence given by him to hereditary influences which often afford explanations of emotional phenomena where individual experiences do not appear sufficient. The study of emotional language is interesting both from a physiological and psychological point of view. Considering its psychological bearings it seems proper, before entering on a detailed description of any emotional expression, to present in outline such a definition and classification of emotions as narrow limits admit of.

An emotion may be defined as a tendency to act accompanied or unaccompanied by a particular feeling. In the common acceptation of the term, emotion means a tendency to act accompanied by a feeling which is the distinctive mark of the emotion. Tendencies to act in ways more or less definite on the application of proper stimuli, when no feeling is present in the sensorium, are respectively known as reflex or automatic actions, the stimuli being external in the former case and internal in the latter case.

The two kinds of emotive tendencies mentioned are separated by no well defined boundary. Emotions accompanied by feeling, when oft repeated, tend to become automatic, while emotions ordinarily unaccompanied by feeling may, in the absence of higher emotions, send impressions to the sensorium.

Instincts comprise a class of emotions, connecting emotions accompanied by feeling with those unaccompanied by feeling.

Confining our attention to what is commonly known as an emotion, it is apparent that the feeling accompanying each is pleasurable or painful. When the feeling is pleasurable the tendency is to continue the course of action entered upon; on the other hand, when the feeling is painful, the tendency is to desist